

What is claimed is:

1. A magnetic head comprising a recording head including a main pole and an auxiliary pole, wherein a magnetic layer is disposed on a trailing side of the main pole, the magnetic layer having a protruding portion protruding towards the main pole, wherein the width of a side of the protruding portion opposite the main pole is smaller than the width of the main pole on the trailing side.
2. The magnetic head according to claim 1, wherein the auxiliary pole is disposed on the trailing side of the main pole farther than the magnetic layer.
3. The magnetic head according to claim 2, wherein the magnetic layer is joined to the auxiliary pole.
4. The magnetic head according to claim 1, wherein the auxiliary pole is disposed on the leading side of the main pole.
5. The magnetic head according to claim 1, further comprising a reproducing head having a magnetoresistive element.
6. The magnetic head according to claim 1, wherein the thickness of the magnetic layer in the direction perpendicular to an air bearing surface of the magnetic layer is smaller than a throat height of the main pole.
7. A magnetic disc apparatus comprising:
 - a disc-shaped perpendicular magnetic recording medium having a recording layer and a soft underlayer;
 - a magnetic head including a recording head and a reproducing head; and
 - a rotary actuator for positioning the magnetic head with respect to the disc-shaped perpendicular magnetic recording medium, wherein

the recording head includes a main pole, an auxiliary pole, and a magnetic layer disposed on the trailing side of the main pole, the magnetic layer having a protruding portion protruding towards the main pole, wherein the width of a side of the protruding portion opposite the main pole is smaller than the width of the main pole on the trailing side.

8. The magnetic disc apparatus according to claim 7, wherein a maximum skew angle α , a width Nw of the side of the protruding portion of the magnetic layer opposite the main pole, a width Tw of the main pole on the trailing side, and a distance GLE between the protruding portion of the magnetic layer and the main pole satisfy the relationship $0.5 \times (Tw - Nw) \leq GLE \times \tan \alpha$.

9. The magnetic disc apparatus according to claim 7, wherein a ratio of a minimum distance GL between the main pole and the magnetic layer to a distance ATS between an air bearing surface of the main pole and a soft underlayer in the disc-shaped perpendicular magnetic recording medium (GL/ATS) is in the range between 0.4 and 1.5.

10. A process of manufacturing a magnetic head comprising a recording head including a main pole, an auxiliary pole, and a magnetic layer disposed on the trailing side of the main pole, the magnetic layer having a protruding portion protruding towards the main pole, wherein the width of a side of the protruding portion opposite the main pole is smaller than the width of the main pole on the trailing side, the process comprising the steps of:

forming a stacked film in which a first magnetic film to be formed into the main pole, a non-magnetic film to be formed into a gap, a second magnetic film to be formed into the protruding portion, a chemical mechanical polishing stopper film, and an inorganic insulating film are sequentially stacked;

forming a resist pattern on the stacked film by a lift-off method;

processing the first magnetic film into the shape of the main pole by ion milling using the resist pattern as a mask;

forming an inorganic insulating film around the first magnetic film processed in the shape of the main pole and the non-magnetic film forming the gap; and

processing the second magnetic film into a magnetic layer piece forming the protruding portion by ion milling.